

## Mars Global Surveyor Mission

The Mars Global Surveyor (MGS) spacecraft will be launched in November of 1996 to the planet Mars for an extended study of the planet's surface, atmosphere, gravitational field and magnetic field. In order to achieve the scientific objectives of the mission, the spacecraft will be inserted into a low-altitude, near-polar, Sun-synchronous orbit. Data will be collected and returned from six prime experiments on the spacecraft for over one Martian year (687 Earth days) and will provide for a better understanding of the geology, geophysics, and climatology of Mars. Five of those six experiments will utilize scientific instruments mounted to the spacecraft. The sixth investigation will collect data about Mars by analyzing the spacecraft's radio signal.

A Delta 27925A launch vehicle will boost the Mars Global Surveyor spacecraft from Cape Canaveral Air Force Station (CCAFS) into a Type 2 transfer trajectory with an interplanetary flight time of about ten months. After arriving at the red planet in September 1997, the MGS spacecraft will be propulsively inserted into a highly elliptical capture orbit with a period of 48 hours. Over the next five months, the spacecraft's orbit will be gradually circularized utilizing aerobraking. This technique consists of lowering the orbit periapsis into Mars' upper atmosphere in order to remove energy from the spacecraft on every periapsis pass and reduce the orbit apoapsis.

Mars Global Surveyor will utilize a Sun-synchronous mapping orbit at a 378 km index altitude, a descending node orientation of 2:00 pm with respect to the fictitious mean Sun, and an orbit inclination of 92.9°. In this orbit, the MGS spacecraft will circle the red planet every 117.65 minutes. Once every seven Martian days (sols), the spacecraft will nearly retrace its ground track. After each seven-sol cycle (88 orbits), the ground track patterns will be offset by 59 km eastward from the tracks on the previous cycle. If the orbit is maintained, the entire network of ground track patterns will repeat after 550 sols (691.7 orbits). This repeat cycle will result in a 99.9% global coverage to be built up from repeated instrument swaths across the planet.

Repetitive observations of the planet's surface and atmosphere from the mapping orbit will be conducted from March 1998 to January 2000. Throughout this entire period, the spacecraft will remain in an orientation with the scientific instruments nadir pointed. The normal sequence of collecting science data will involve recording continuously for 24 hours, and then playing the data back through the Deep Space Network (DSN) during a 10-hour tracking pass once every Earth day. Approximately every third Earth day, an additional tracking pass will be scheduled to return high-rate, real-time data.

From the end of the mapping until the end of the mission in January 2003, MGS will support the Mars Surveyor Program by relaying data from various landers back to the Earth through the Mars Relay antenna.

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